ABSTRACT

Reactive foils and their uses are provided as localized heat sources useful, for example, in ignition, joining and propulsion. An improved reactive foil is preferably a freestanding multilayered foil structure made up of alternating layers selected from materials that will react with one another in an exothermic and self-propagating reaction. Upon reacting, this foil supplies highly localized heat energy that may be applied, for example, to joining layers, or directly to bulk materials that are to be joined. This foil heat-source allows rapid bonding to occur at room temperature in virtually any environment (e.g., air, vacuum, water, etc.). If a joining material is used, the foil reaction will supply enough heat to melt the joining materials, which upon cooling will form a strong bond, joining two or more bulk materials. If no joining material is used, the foil reaction supplies heat directly to at least two bulk materials, melting a portion of each bulk, which upon cooling, form a strong bond. Additionally, the foil may be designed with openings that allow extrusion of the joining (or bulk) material through the foil to enhance bonding.